December 2024

METROPOLITAN COUNCIL

SAFE STREETS Research + Consulting

MEMO

TO: Heidi Schallberg, AICP, Metropolitan Council
FROM: Safe Streets Research + Consulting
DATE: 2024-12-30
RE: REVISED Programmatic Strategies and Actions
PROJECT: P017 Regional Safety Action Plan

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Introduction to the Program of Strategies

This program of strategies outlines five key strategic areas the Council can use to work toward eliminating traffic deaths and serious injuries in the region. These strategies are grounded in a Safe System Approach, through which the Council aims to eliminate fatal and serious injury crashes.

This program, combined with prioritized project lists from Task 10, satisfies the Safe Streets and Roads for All requirements. It has been developed based on a robust safety analysis and public engagement process for the region and it relies on the best available evidence and noteworthy practices for safety planning and implementation.

Timelines are suggested for each action based on their priority and time horizon. The following time horizons are suggested:

- **Ongoing:** Actions that can occur continuously with regular Council activities.
- **Short-term:** Over the next 0-2 years.
- **Medium-term:** Over the next 3-5 years.
- **Long-term:** Over the next 6-10 years.

Refer to Task 10 materials for documentation about how projects were selected and prioritized.

The following text is an excerpt of the requirements for an SS4A-compliant safety action plan and guides the work in Task 10 and Task 11.

> *Identification of a comprehensive set of projects and strategies, shaped by data, the best available evidence, and noteworthy practices, as well as stakeholder input and equity considerations, that will address the safety problems described in the Action Plan. These strategies and countermeasures focus on a Safe System Approach, effective interventions, and consider multidisciplinary activities. To the extent practical, data limitations are identified and mitigated.*
>
> *Once identified, the list of projects and strategies is prioritized in a list that provides time ranges for when the strategies and countermeasures will be deployed (e.g., short-, mid-, and long-term timeframes). The list should include specific projects and strategies, or descriptions of programs of projects and strategies, and explains prioritization criteria used.*

Strategy 1. Produce new or updated Regional Safety Action Plan regularly, including underlying comprehensive crash analysis and reactive and proactive screenings for all modes.

Action 1.1. Combine future Regional Safety Action Plans and updates to focus on safety for all road users.

Suggested Timeline: Depends on the timeline for next Regional Safety Action Plan major or minor update, per Action 1.2. Likely medium-term (3 to 5 years).

The Council's first two major safety plans were split by mode, with the Pedestrian Safety Action Plan published in 2021 and the Regional Safety Action Plan (focused primarily on motorists and bicyclists) published in 2024. The Council should combine future safety planning efforts to cover all modes together.

Action 1.2. Update the Regional Safety Action Plan and supporting analyses on a recurring, data-driven schedule.

Suggested Timeline: Medium-term (3 to 5 years).

Safety analyses typically look at 3-5 years of crash data, and preferably 5 years when considering crashes involving less numerous but severely affected modes (pedestrians, bicyclists, other personal conveyances, motorcyclists). The Regional Safety Action Plan used crash data from 2018-2022 (5 years). The Pedestrian Safety Action Plan used crash data from 2016 to 2019 (4 years due to a major structural data change prior to 2016).

Given this pooling of crash data over time, very frequent updates (e.g., annual) are not recommended because most of the data will overlap with the prior analysis, masking new trends and patterns.

Consider major Regional Safety Action Plan updates ***every five years***, consistent with the update frequency of MnDOT's Strategic Highway Safety Plan (SHSP) and Vulnerable Road User Safety Assessment (VRUSA). If the timing of these update cycles aligns, both agencies might find some efficiency in conducting the analysis together. These major updates present opportunities for the Council to incorporate newer data, revise methodologies for consistency with best practices, and address some of the gaps and limitations from prior safety analyses.

Minor updates, such as updating only the High Injury Streets with recent crashes, may be completed every 2-3 years if desired, which translates to about once in between 5-year regular updates of Regional Safety Action Plan updates. Minor updates entail joining crashes to existing sliding windows features and re-calculating each segment's High Injury Streets status given existing thresholds developed in the prior major plan or analysis. Given the pooling of crash data across five years, minor updates more frequently than every 5 years may not be necessary.

Table 1 illustrates how these recommended major and minor update timelines could be implemented, with minor High Injury Streets updates occurring 3 years after the completion of the previous Regional Safety Action Plan, and a major analysis update and update to the Regional Safety Action Plan occurring 5 years after the completion of the previous one. Publication years and crash data years are both shown to illustrate how crash data are pooled over time and updates are staggered to ensure at least 40-60% new data are included in any given analysis update.

Table 1. Example update cycle for regional safety action plans, comprehensive crash analysis, and minor High Injury Streets updates. Years are provided for illustration purposes only.

Plan or Study	Publication Year	Crash Data Years	Safety Action Plan or Update	Comprehensive Crash Analysis	Reactive Screening / High Injury Streets	Proactive Screening / CRI, Systemic, and/or Crash Rates
Pedestrian Safety Action Plan	2021 *(complete)*	2016-2019	Pedestrians Only	Pedestrians Only	No	Pedestrians Only
Regional Safety Action Plan	2024 *(in progress)*	2018-2022	Bicyclists and Motorists Only	Bicyclists and Motorists Only	All Modes	Bicyclists and Motorists Only
Optional Minor Update to High Injury Streets	2027	2021-2025	No	No	Minor Update Only	No
Update to Regional Safety Action Plan	2029	2023-2027	All Modes	All Modes	Full Update	All Modes
Optional Minor Update to High Injury Streets	2032	2026-2030	No	No	Minor Update Only	No
Update to Regional Safety Action Plan	2034	2028-2032	All Modes	All Modes	Full Update	All Modes

Action 1.3. Investigate opportunities to strengthen regional safety-related data.

Suggested Timeline: Ongoing.

Data about transportation facilities, pedestrian and bicyclist volumes, and motorist travel speeds are important for identifying and proactively addressing risky conditions on the roadway. Yet high quality data about these elements are rarely available at the regional scale.

The Crash Rates calculation in this Regional Safety Action Plan used bicyclist volume estimates provided via a consultant's subscription to a data vendor. There is no guarantee this data resource will be available in future Regional Safety Action Plan updates.

The Council is already investigating opportunities to strengthen regional safety-related data for all road users, such as through the upcoming Regional Sidewalk Dataset Study. The Council should continue to investigate opportunities across the agency to advance safety-related data availability and quality.

The agency can start with a review of safety-related data that the agency already has, including an assessment of each data element's quality and suitability. For example, vendor speed data designed for modeling may also be suitable for safety analysis. Once issues and gaps have been identified, the next steps may include coordinating with partner agencies that provide transportation and land use data to the Council to request/require higher data specifications (e.g., roadway data that are compliant with the Model Inventory of Roadway Elements, or MIRE), coordinating with other Council functions such as travel demand modeling to access speed-related data, or purchasing or collecting new data.

Action 1.4. Develop and implement more nuanced pedestrian and bicyclist screening methods that account for countermeasures/mitigation.

Suggested Timeline: *Medium- or long-term (3 to 5 or 6-10 years), potentially aligned with the next major Regional Safety Action Plan update.*

Network screening on the most common and severe risk factors – number of through lanes, posted speed limit, and motorist volumes – is a powerful way to proactively identify potential safety issues in the region. However, there are some limitations to this approach. Posted speed limit is a poor proxy for actual motorist travel speeds – particularly at night when streets are uncongested and about 75% of pedestrian deaths occur. Existing countermeasures and dedicated pedestrian and bicyclist facilities may mitigate some of the risks caused by multilane facilities and high motorist speeds.

An example of this need is the case of Hiawatha Avenue (Trunk Highway or TH 55) from Downtown Minneapolis to 46th Ave S. The street has a high Crash Risk Index (CRI) for motorists, a high Crash Risk Index for bicyclists, and appears on the High Injury Streets for both modes. Yet it has a fully separated shared use path along its entire extent. The separated facility mitigates the risk of high speeds, high volumes, and multiple motorist travel lanes while people are bicycling along the shared-use path midblock. However, these risk factors remain present whenever bicyclists need to turn or cross Hiawatha Avenue.

Pending data availability (Action 1.3), the Council should research, develop, and implement a more refined screening method that accounts for pedestrian and bicyclist facilities and safety countermeasures. Options may include Level of Traffic Stress or other similar approaches that provide a more nuanced, granular look at facility and risk factor combinations. If suitable data are available, this could be integrated as a task within the next Regional Safety Action Plan

(medium-term). Alternatively, this could be a stand-alone study on a medium- or long-term timeline.

Strategy 2. Implement a Safety in All Policies philosophy throughout the Council's planning efforts and activities.

The Council should evaluate regional planning efforts and activities for opportunities to introduce or strengthen safety into all Council functions, even where safety is not the primary focus. A "Safety in All Policies" philosophy would help the agency ensure alignment with the Safe System Approach and the agency's goals in all its work. The actions that support this strategy are grounded in the Safe System Approach and leverage key findings about common safety risk factors from the Regional Safety Action Plan, such as roadway speed, width/number of lanes, and volume.

Safety in All Policies requires an expert review of the Council's policies and plans. The draft Transportation Policy Plan (TPP) calls for the creation of a Regional Traffic Safety Technical Working Group (Action 10B). This working group should be asked to assist with implementing Safety in All Policies.

Action 2.1. Review all future TPP policies and actions, even those not explicitly related to safety, through the lens of a Safe System Approach.

Suggested Timeline: Medium-term (3 to 5 years), aligned with the next TPP update.

Future updates to the TPP present opportunities to review all policies and actions for safety implications. The Council already asks safety expert stakeholders to review safety-related TPP policies and actions. The Council should also have safety experts or the Regional Traffic Safety Technical Working Group (a new group recommended in the 2050 TPP) review all other policies and actions for the potential to have safety-related implications or unintended consequences.

Figure 1 shows a simple framework with key questions to ask of each policy and action. These questions are aligned with analysis results from this Regional Safety Action Plan that identified speed, number of lanes, and volume as risk factors for motorists and bicyclists on streets and arterials. The Pedestrian Safety Action Plan also identified these as risk factors for pedestrians. Both sets of findings speak to a broader pattern for the surface network: in general, higher traffic volumes and vehicle miles traveled are correlated with more severe crashes, particularly when facilities are built for peak-hour volumes and operate uncongested and with much higher speeds at off-peak times. The analysis completed in this Regional Safety Action Plan was focused on at-grade facilities, not freeways. The specific relationship between freeways and traffic safety warrants further study. Nonetheless, increases in VMT, by definition, increase exposure to crash risk.

For a policy or action that may directly or indirectly lead to increasing the number of lanes, increasing VMT, or increasing speed, the framework encourages the evaluators to propose alternative policies that avoid or mitigate these risk factors and document any other efforts to consider safety around these risk factors. Evaluators should consider the impacts of risk factors and any proposed mitigations for all road users, not just motorists. As an example, the 2050

TPP includes Action 26A, outlining a mobility hierarchy intended to prioritize travel demand management, transit usage, and other options prior to expanding roadway capacity.

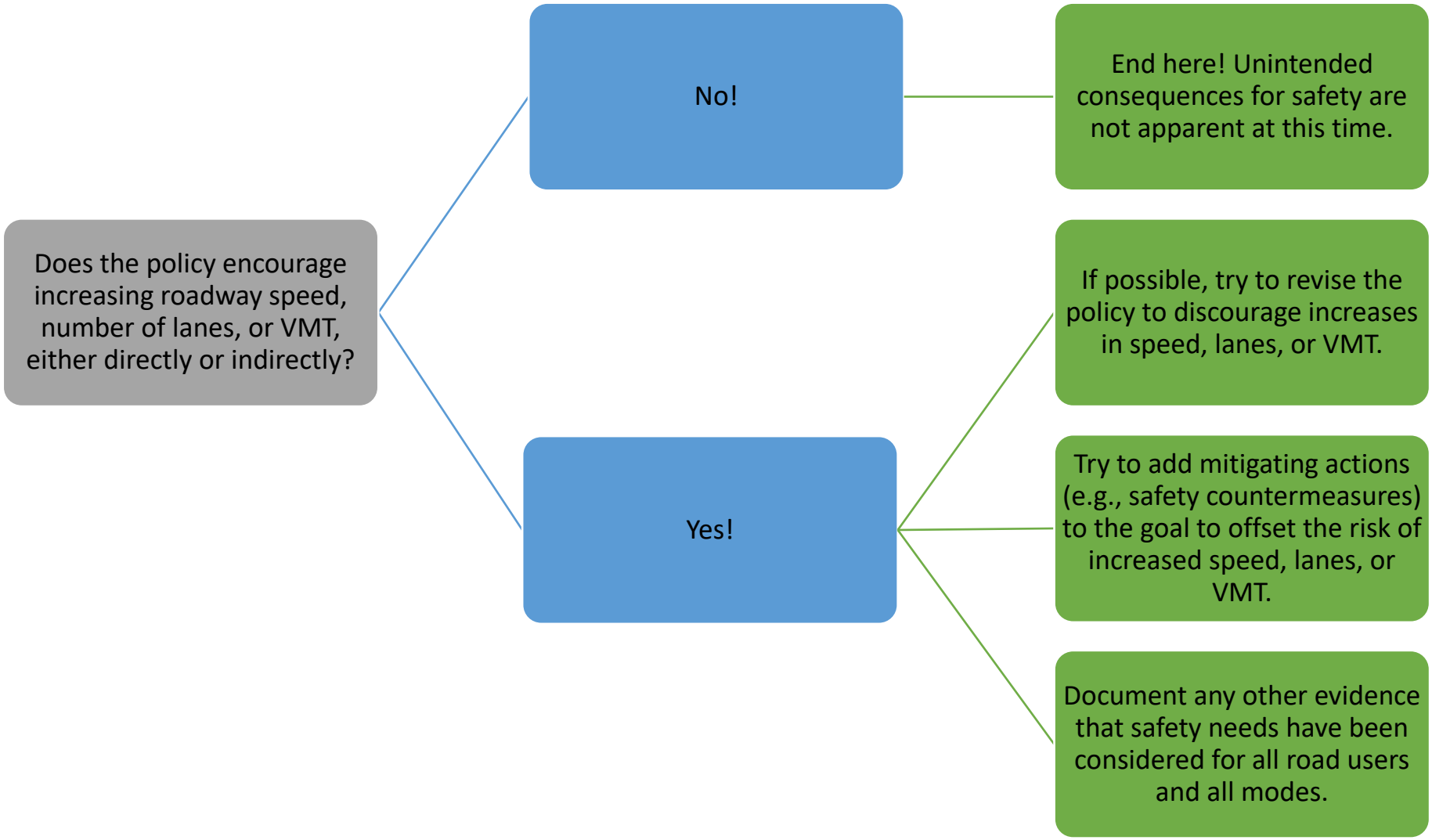

Figure 1. **Framework for assessing potential safety implications or unintended consequences of TPP policies and actions.**

Action 2.2. Evaluate the potential to incorporate safety into comprehensive planning activities.

Suggested Timeline: Ranges short-, medium-, and long-term within the action's activities (0 to 10 years).

The comprehensive planning process may present an opportunity to build safety into one of the Council's core functions. The Movement and Place Framework, developed in Australia and New Zealand, offers lessons about the connections between land use and safety that support the Safe System Approach. In this framework, land use informs how roadways should be designed to prioritize or de-emphasize motorist speed and travel. More information about Movement and Place can be found in Section 4 of the FHWA Global Benchmarking Program's technical report, "Improving Pedestrian Safety on Urban Arterials: Learning from Australasia."[1] Through this lens, the Council should support local communities in understanding the nexus between land use and safety.

The Council provides System Statements to all communities in the region to inform how the community is affected by the Council's policy plans for regional systems, including transportation.[2] A short-term action the Council take is to include results from the Regional Safety Action Plan in these System Statements or in supplemental information, showing each community if it has any corridors or intersections with safety concerns identified by High Injury Streets, Crash Risk Index, or Crash Rates.

The Council should support and encourage local agencies to use the results of these safety analyses when developing their local comprehensive plans. This may take the form of a new element focused on safety or the incorporation of safety-related data and metrics into the existing transportation and land use elements. Agencies could note in their plans where there are potentially mismatched roadway and land use combinations that warrant further investigation and prioritization. Mismatches might include busy arterial roads with housing, transit, or other destinations along them where people may need or want to cross. Refer to Section 4 of the FHWA publication described above for more guidance about using the Movement and Place Framework to plan for compatible street design and land use. This may also be an opportunity to request that local agencies provide GIS layers of any safety planning work they have already done – such as locally developed high injury identification for roads.

Action 2.3. Conduct a study to evaluate the minor arterial system through a safety lens and recommend design guidance or minimum safety standards for these facilities.

Suggested Timeline: Medium- or long-term (3 to 5 or 6 to 10 years).

Arterials are a common risk factor for severe crashes for all road users. Incorporating lessons from NCHRP 1036 and the Safe System Design Hierarchy, this is an opportunity to set a "floor"

[1] https://international.fhwa.dot.gov/programs/mrp/docs/FHWA-PL-23-006.pdf
[2] https://metrocouncil.org/Communities/Planning/Local-Planning-Assistance/System-Statements.aspx

or “baseline” for safety on the minor arterial system. The Council has previously evaluated various aspects of the arterial system and continues to call for an evaluation of arterials in the TPP; integrating the Safe System Road Design Hierarchy into this evaluation makes this a powerful opportunity to address a widespread safety problem.

Action 2.4. Review and update traffic safety metrics that are monitored regularly by the Council.

Suggested Timeline: Ongoing.

The Council already monitors key safety statistics like the number and rate of crashes with serious or fatal injuries. These statistics are used in Council publications such as the Transportation System Performance Evaluation, which is updated every four years to support the development of the next TPP update.

Performance metrics should reflect mode-specific outcomes, such as the following:

- Number of fatal or serious injury crashes, stratified by mode
- Percentage of crashes resulting in a fatality or serious injury, stratified by mode
- Density of severe crashes per mile on the region’s minor arterial system, stratified by mode

Strategy 3. Assess and evaluate how the Council allocates resources to ensure that investments improve safety conditions for all road users and do not sacrifice safety or comfort in the name of convenience, throughput, or delay.

The Council is currently evaluating its primary funding mechanism for transportation investments: the Regional Solicitation. This evaluation would bring the Regional Solicitation into alignment with the 2050 TPP goals, objectives, policies, and actions. The Council is also currently conducting a before/after evaluation of projects funded by the Regional Solicitation to see how well-funded projects performed on a suite of performance measures developed for the Solicitation's funding categories, including safety measures. Many of the actions recommended for the Regional Solicitation can also be applied to the Highway Safety Improvement Program (HSIP).

Action 3.1. Develop region-specific guidance about implementing the Safe System Road Design Hierarchy to address safety for all road users.

Suggested Timeline: Medium-term (3 to 5 years).

The Safe System Pyramid illustrates the principle that population-level efforts that require minimal individual effort have larger, more widespread impacts on safety.[3] The Safe System Road Design Hierarchy (SSRDH) operationalizes this principle into a specific hierarchy of strategies that aims to prioritize more effective countermeasures over less effective educational and awareness campaigns.

The Council should develop supporting guidance for how to use this resource in a way that reflects the region's modal priorities and other goals to ensure that the SSRDH is implemented in a way that benefits all road users and does not unduly burden certain modes of travel relative to others. For example, the SSRDH's top-tier recommendation to remove severe conflicts might be used to justify grade-separated pedestrian crossings. In theory, pedestrian grade separation (underpasses or overpasses) removes severe crossing conflicts. However, in practice, grade separation for pedestrians over at-grade streets and roads can causes excessive detours or delay, and compliance is generally poor, resulting in worse access for people outside the vehicle.

Region-specific guidance can help address some of these tensions by describing how modes should be prioritized within the hierarchy and depending on the context. This guidance would serve as the foundation for subsequent actions under this strategy, such as evaluation of the scoring criteria used to compare the expected safety benefits of funding applications.

[3] https://www.sciencedirect.com/science/article/pii/S2590198223001525, Fig. 3.

Action 3.2. Conduct a study to apply the Safe System Policy-based Alignment Framework to the Regional Solicitation, HSIP, and other funding programs to assess their potential impacts on safety and recommend revisions that may increase safety benefits.

Suggested Timeline: Medium-term (3 to 5 years).

The Council should evaluate the proposed changes to the Regional Solicitation program through a Safe System lens to ensure safety is woven throughout funding categories, scoring criteria, and other program elements.

The FHWA's Safe System Policy-based Alignment Framework[4] provides a consistent and thorough framework that the Council could use for assessing these proposed changes. The Policy-based Alignment Framework asks the following questions:

1. Does the policy identify the need to focus on eliminating fatal and serious injury crashes versus all crashes?
2. Does the policy address human error in fatal and serious injury crashes? (i.e., does it evaluate the human factors related to the crashes)
3. Does the policy account for crashes that have a higher likelihood of fatal or serious injury due to mode, speed, or angle of collision?
4. Does the policy embrace a multi-disciplinary and multi-jurisdictional team, implying that responsibility is shared and that prioritization is not only focused on one roadway type or only infrastructure improvements?
5. Does the policy proactively account for risks and behaviors that could lead to fatal and serious injury crashes?
6. Does the policy integrate multi-faceted approaches to safety to ensure that if one element fails, that others support the system?
7. Does the policy consider equity (e.g., that all users are provided the tools to experience the transportation system equally)

More information and a scoring workbook for the Safe System Policy-based Alignment Framework are available from FHWA.[5]

Action 3.3. Critically assess non-safety elements of the Regional Solicitation and other funding programs for their indirect or unintended impacts on safety through a Safety in All Policies lens.

Suggested Timeline: Medium- or long-term (3 to 5 or 6 to 10 years).

[4] https://highways.dot.gov/sites/fhwa.dot.gov/files/2024-04/FS_FHWA_SSA_Frameworks_ACCESSIBLE.pdf, https://highways.dot.gov/safety/zero-deaths/safe-system-policy-based-alignment-framework

[5] https://highways.dot.gov/sites/fhwa.dot.gov/files/2024-04/FS_FHWA_SSA_Frameworks_ACCESSIBLE.pdf, https://highways.dot.gov/safety/zero-deaths/safe-system-policy-based-alignment-framework

The Policy-based Alignment Framework is designed to assess safety-related policies and actions and may not be very well-suited to capture safety-related unintended consequences of non-safety policies. However, safety *can* be affected by policies and actions that are not explicitly about safety. Unintended safety consequences may arise from investment decisions that are misaligned with the region's safety goals. The Safety in All Policies philosophy (Strategy 2) can guide the Council through assessing *all* funding categories and criteria for these potential safety consequences, beyond the safety-specific ones addressed through Action 3.2.

Using a simple framework, the Council should assess the non-safety elements of the Regional Solicitation and other funding programs for potential indirect or unintended impacts on safety. The framework is based on risk factors that were identified in the Pedestrian Safety Action Plan and Regional Safety Action Plan: wider streets, faster streets, and higher motorist volumes.

This framework asks two simple questions: whether (1) funding criteria and/or (2) scoring criteria are organized around or reward increasing motorist speed, motorist capacity, or motorist VMT. When the answer to either of these questions is yes, then additional questions ask about revisions, mitigation, or other actions that can address the potential safety impacts. The safety impacts of entire funding categories are evaluated separately from the safety impacts of individual scoring metrics or criteria within a category. Figure 2 shows the questions and process for entire funding categories. Figure 3 shows the questions and process for individual scoring metrics or criteria.

An example of this framework in action might be a funding category dedicated to roadway expansion and capacity increases. Projects submitted through this funding category may be more likely to increase overall systemwide VMT, increase the number of lanes, and increase travel speeds. The framework may prompt the Council to include scoring criteria in this category that reward mitigations that reduce or eliminate potential negative safety impacts or even improve safety conditions for all road users without adding significant detour or delay for people outside the vehicle.

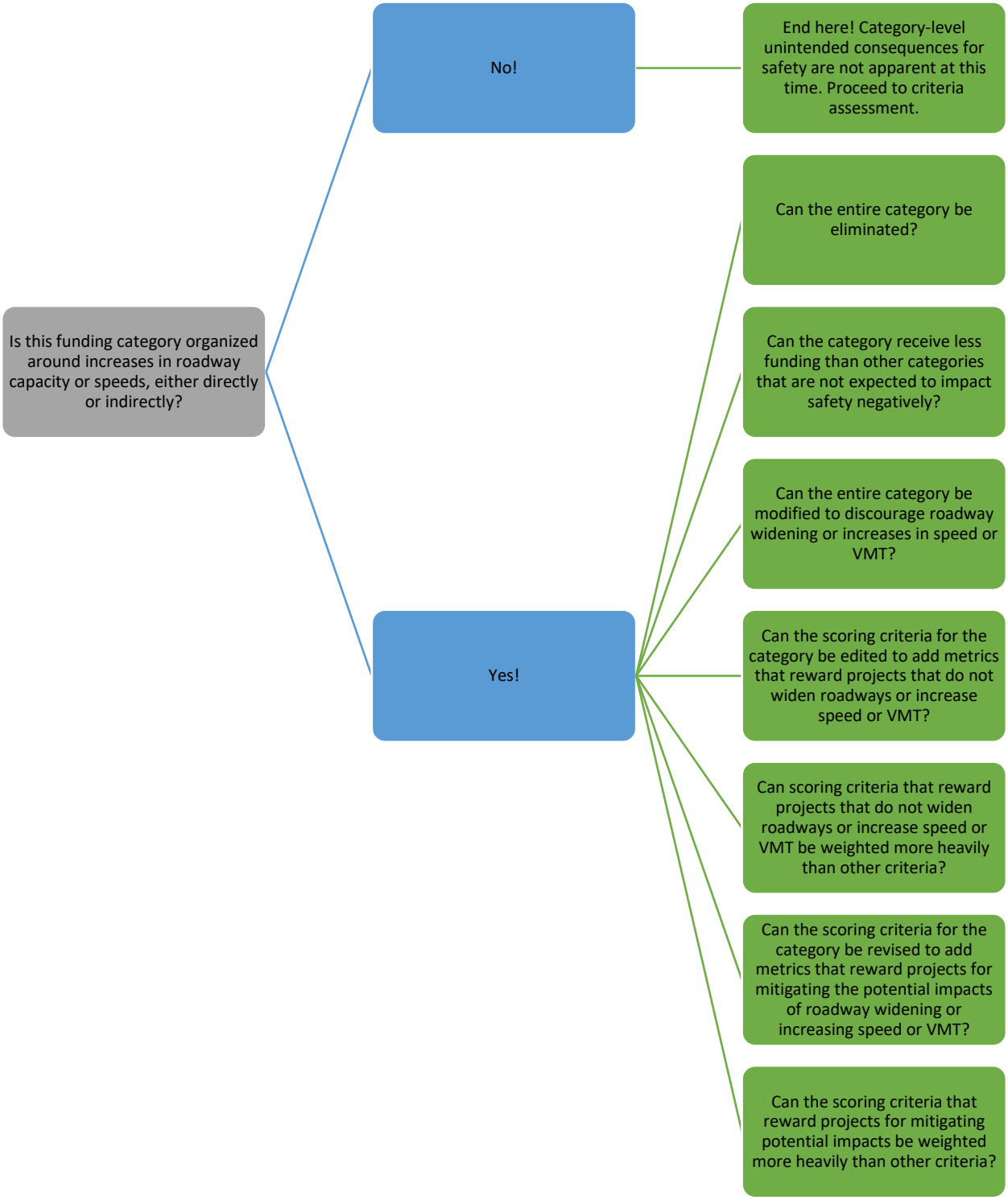

Figure 2. **Framework for assessing funding categories for potential unintended safety impacts.**

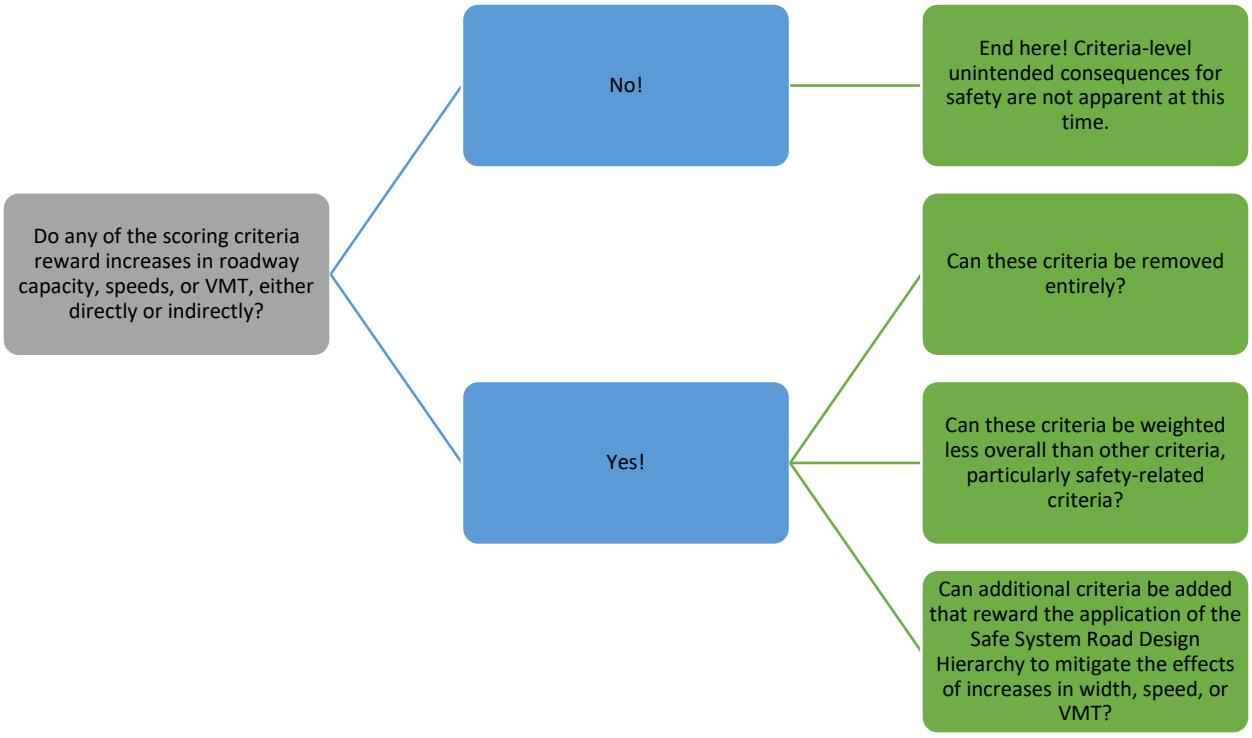

Figure 3. Framework for assessing scoring metrics or criteria for potential unintended safety impacts.

Action 3.4. Monitor and evaluate safety-related performance measures of the projects that receive funding using short-term and long-term measures.

Suggested Timeline: Medium- or long-term (3 to 5 or 6 to 10 years).

Real-world safety performance (i.e., whether severe crashes were reduced or eliminated) is already monitored via the Council's periodic before/after evaluation of funded projects. Due to the long process from an initial funding application to a completed project and the accumulation of three to five years of post-construction crash report data, severe crash reduction can be thought of as a longer-term metric. The Council should continue to periodically conduct before/after analyses to evaluate these longer-term metrics, particularly for projects where transportation safety countermeasures are core features.

The Council should develop and implement shorter-term metrics that align with a Safe System Approach to supplement the longer-term metrics. These metrics, designed around key findings from the Regional Safety Action Plan and Pedestrian Safety Action Plan, may include metrics like the following.

- Number of safety-focused projects that were awarded funding, or as part of which safety-focused countermeasures feature prominently as part of the overall project
- Percentage of funding allocated to safety-focused projects
- Miles of roadway and count of intersections awarded funding for safety-focused projects
- Miles of roadway funded for a project that includes speed reduction
- Miles of roadway funded for a project that includes roadway reallocation/lane reduction

Action 3.5. Assess safety-related scoring criteria for opportunities to shift toward more systemic project effectiveness metrics than the existing benefit-cost ratio.

Suggested Timeline: Medium- or long-term (3 to 5 or 6 to 10 years).

Benefit-cost ratios are used in the Regional Solicitation and HSIP to compare the potential impact of one project to another. They use the number of crashes happening at a potential project site and a crash modification factor for the proposed countermeasure(s), among other data elements.

This ratio provides a standardized metric for comparing one project to another. However, the ratio does not always lead to prioritization of effective projects for a number of reasons.

Crash modification factors do not exist for every countermeasure. Curb extensions or bulb-outs, a common countermeasure designed to increase pedestrian safety when crossing the street, have been on the Crash Modification Factor Clearinghouse's most-wanted list for years.[6] This absence may lead to an underestimation of the potential benefits of a project to pedestrians that includes curb extensions.

[6] https://cmfclearinghouse.fhwa.dot.gov/most_wanted.php

By relying on historic crash counts, this approach may also under-value the potential impact of projects that target risky conditions proactively or that focus on safety for road users with smaller mode shares (e.g., walking, bicycling, transit).

The Council should consider shifting from a standard benefit-cost ratio to a modified version that addresses some of the shortcomings of a classic benefit-cost ratio, such as the safety benefits estimation method included in *NCHRP 08-149 Estimating Benefits of Closing Gaps in Active Transportation Networks*.[7] This method incorporates the use of a crash baseline derived from a more systemic estimate of crashes under similar designs than observed crash history. It also includes recommendations for choosing a placeholder or substitute crash modification factor for treatments that do not yet have a published CMF.

Action 3.6. Explore opportunities for the Council to offer funding for local safety planning efforts.

Suggested Timeline: Medium- or long-term (3 to 5 or 6 to 10 years).

The Council should consider opportunities in the future to support local safety planning efforts, especially where these align with regional goals. For example, safety planning funds could be added to the Regional Solicitation, or the Council could offer financial support for local agencies seeking federal safety funds with a matching requirement. This action could also support local agencies in putting the data and analysis produced through the Regional Safety Action Plan into local use.

[7] This guidance is forthcoming from NCHRP. More information about the project is available here: https://apps.trb.org/cmsfeed/TRBNetProjectDisplay.asp?ProjectID=5086

Strategy 4. Use the results from the network screening analyses in the Regional Safety Action Plan and Pedestrian Safety Action Plan to inform Council decision-making, investments, policies, and other activities.

The Council produced seven different network screening analyses as part of the Regional Safety Action Plan and Pedestrian Safety Action Plan (see Table 2). Each of these analyses helps identify areas that have either (1) a historical pattern of fatal and serious injury crashes or (2) the presence of risk factors that are correlated with fatal and serious injury crashes.

Table 2. Reactive and Proactive Safety Screening Analyses in the Regional Safety Action Plan and Pedestrian Safety Action Plan.

Safety Plan	Analysis Type	Unit of Analysis	What Modes It Covers	What It Measures	Reactive or Proactive?
Regional Safety Action Plan	High Injury Streets (HIS)	Segment	All Modes Pedestrians Bicyclists Motorcyclists Motorists	High *densities* of fatal and injury crashes	Primarily reactive
Regional Safety Action Plan	Reactive Priority Lists	Segments	All Modes	Top 25 corridors in the region and *up to* top 10 corridors in each county based on HIS	Primarily reactive
Regional Safety Action Plan	Crash Risk Index (CRI)	Segments	Bicyclists (and can be used for Pedestrians) Motorists (including Motorcyclists)	Potentially crash-prone areas based on mode-specific roadway and contextual risk factors	Proactive

Safety Plan	Analysis Type	Unit of Analysis	What Modes It Covers	What It Measures	Reactive or Proactive?
Regional Safety Action Plan	Proactive Priority Lists	Segments Intersections	Bicyclists (and can be used for Pedestrians) Motorists (including Motorcyclists)	Top 25 corridors and intersections in the region and *up to* top 10 corridors and intersections in each county based on CRI	Primarily Proactive
Regional Safety Action Plan	Crash Rates	Segments	Bicyclists Motorists (including Motorcyclists)	High *rates* of crashes when normalized by miles traveled	Mix of Reactive and Proactive
Pedestrian Safety Action Plan	Transit stops and stations	Points	Pedestrians	Locations of transit stops and stations	Proactive

Note that none of these layers explicitly targets proactive safety needs for pedestrians. Instead, we recommend that pedestrian proactive needs be identified by overlaying the proactive bicyclist Crash Risk Index layer with a layer of transit stops and stations. The roadway risk factors are similar for all modes: speed, lanes, and motorist volume. Transit was found to be a strong correlate of pedestrian risk in the Pedestrian Safety Action Plan due to its association with pedestrian volumes and exposure. Future safety analyses can be completed simultaneously for all modes so that the safety data are better integrated.

The Council should use these results internally throughout its safety-related and other work as described in this strategy. *Actions to support use of these analyses among the Council's partner agencies are described in Strategy 5.*

Action 4.1. When the Council aims to prioritize safety investments that specifically focus on existing safety concerns, focus first on reactive analyses.

Suggested Timeline: Medium- or long-term (3 to 5 or 6 to 10 years).

The High Injury Streets analysis identified locations with a proven historical pattern of fatal and serious injury crashes. About 31% of the region's fatal and serious injury crashes (968) happen on just 2% of the region's streets and roads (370 miles). Concentrating efforts in these areas may help reduce the region's total number of fatal and serious injury crashes.

Proactive analyses of all types are also helpful, as the conditions used to identify these locations are correlated with an increased risk of fatal and serious injury crashes. Note that these reactive and proactive lists may include segments or intersections that already have safety projects planned or programmed. Projects that are implemented on these identified priorities should be monitored to see if the safety need has been successfully addressed by the project. The exact scoring mechanism may need to account for both scenarios in which no proposals are on a top priority list (e.g., such as relative scoring) and proposals for recently-improved facilities (e.g., where a top priority candidate has already had safety countermeasures installed recently).

The Council should use the following hierarchy of analysis results to identify safety priorities, shown in Figure 4.

Figure 4. Ranking of analysis results for prioritizing safety-focused projects.

The tiers are defined as follows:

- Tiers 1 and 2 speak to any corridor or intersection included in the top 25 reactive and proactive lists, with Tier 1 (reactive) being weighted more strongly than Tier 2 (proactive).
- Tier 3 encompasses all streets regionwide identified as a High Injury Street.

- Tier 4, like tiers 1 and 2, includes all corridors and intersections included in one of the top 10 county-level reactive and proactive lists.
- Tier 5 broadly includes:
    - Areas that score highly on the Crash Risk Index (values greater than 15).
    - Areas that score highly on Crash Rates (greater than 25% for bicyclist serious crashes, greater than 50% for bicyclist minor injury crashes, and greater than 50% for motorist serious crashes).
    - Areas with one or more fixed route transit stops or stations within 250 feet or along eligible boarding/alighting portions of a flag-stop transit route.
- Tier 6 includes any street identified in a local or statewide safety plan's High Injury Streets, High Injury Network, or similar analysis. The analysis should have been done as part of a dedicated safety plan, and it should have focused primarily or exclusively on fatal and serious injury crashes.

Specific weights for each tier have not yet been developed.

Action 4.2. Cross-reference non-safety projects and investments with these results to identify safety-related needs.

Suggested Timeline: Medium- or long-term (3 to 5 or 6 to 10 years).

Projects that are not explicitly about safety still provide an opportunity to improve safety opportunistically. When the Council wants to evaluate the potential safety benefit of other types of projects, prioritize projects that are consistent with the Safe System Road Design Hierarchy. In this situation, reactive and proactive safety analyses can have roughly equal importance. The Council should use the following hierarchy of analysis results to prioritize safety potential in other project types, shown in Figure 5.

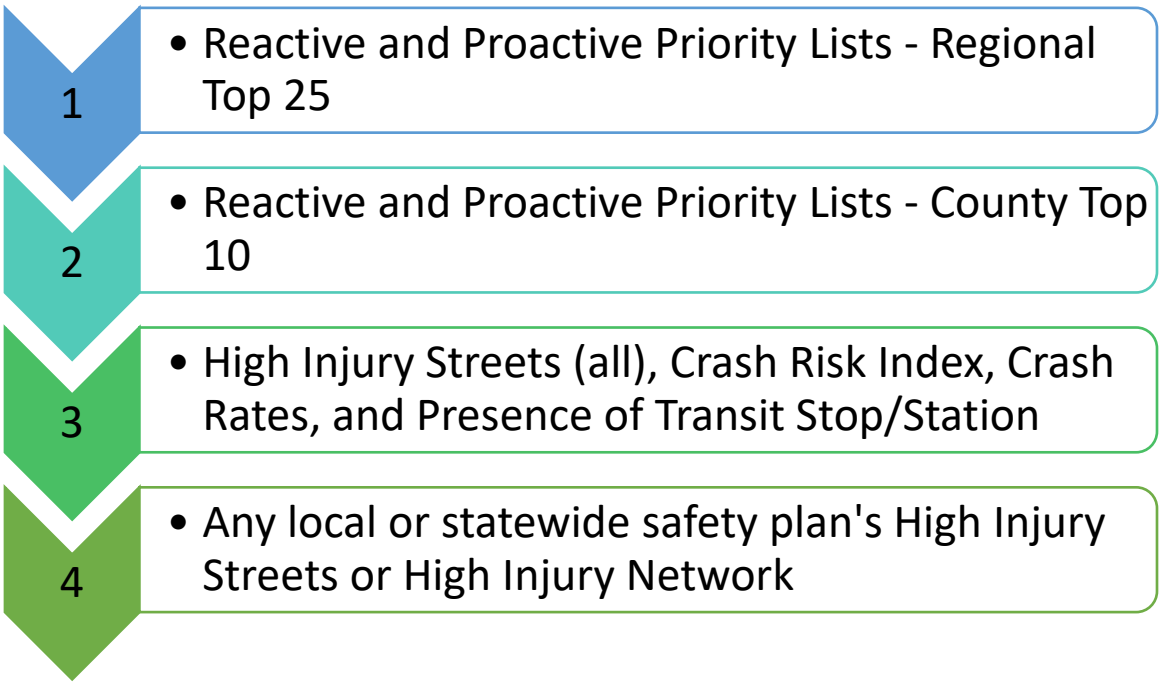

Figure 5. **Ranking of analysis results for prioritizing safety-focused projects.**

The tiers are defined as follows:

- Tier 1 includes any corridor or intersection included in the top 25 reactive and proactive lists.
- Tier 2, like tier 1, includes all corridors and intersections included in one of the top 10 county-level reactive and proactive lists.
- Tier 3 broadly includes:
    - Areas that score highly on the Crash Risk Index (values greater than 15).
    - Areas that score highly on Crash Rates (greater than 25% for bicyclist serious crashes, greater than 50% for bicyclist minor injury crashes, and greater than 50% for motorist serious crashes).
    - Areas with one or more fixed route transit stops or stations within 250 feet or along eligible boarding/alighting portions of a flag-stop transit route.
- Tier 4 includes any street identified in a local or statewide safety plan's High Injury Streets, High Injury Network, or similar analysis. The analysis should have been done as part of a dedicated safety plan, and it should have focused primarily or exclusively on fatal and serious injury crashes.

Specific weights for each tier have not yet been developed.

Action 4.3. Incorporate analysis results into Council geospatial analyses.

Suggested Timeline: Medium- or long-term (3 to 5 or 6 to 10 years).

Where appropriate, the Council should overlay geospatial analysis results with the regional priority lists and High Injury Streets. Visualizing these data alongside the Council's work on equity, housing, land use, long-range transit planning, and other planning activities would keep safety in mind and further reinforce the Safety in All Policies strategy.

Strategy 5. Encourage and support local agencies in using the results from the network screening analyses in the Regional Safety Action Plan and Pedestrian Safety Action Plan to inform each agency's decision-making, investments, policies, and other activities.

Table 2 in the Strategy 4 section lists seven different analyses that the Council completed as part of the Regional Safety Action Plan and Pedestrian Safety Action Plan.

In addition to using the results from these analyses internally, the Council should also make these results available to partner agencies throughout the region and offer technical support in using the results to inform decision-making, investments, policies, and other activities.

Action 5.1. Continue to maintain an online mapping application containing the results of the High Injury Streets, Crash Risk Index, and Crash Rate analysis for local and partner agency use.

Suggested Timeline: Short-term and ongoing (0 to 2 years).

The Council developed an online map that shows High Injury Streets, Crash Risk Index, Crash Rates, and Regional Reactive Corridors and Proactive Corridors and Intersections, overlaid with equity data and dedicated bicycle and shared use facilities. The Council should continue to maintain this online resource to make the results available for local planning efforts.

Action 5.2. Publish (or make available upon request) GIS layers plus accompanying methodologies containing results from the safety screening analyses from the Regional Safety Action Plan.

Suggested Timeline: Short- or medium-term (0 to 2 or 3 to 5 years).

Datasets of interest include the following:

1. Segments with High Injury Streets Status, Reactive Priority List Status, and Sliding Windows Scores
    a. Full sliding short windows spatial dataset
    b. Top 25 regional projects by mode and top <=10 projects (all modes) per county datasets
2. Segments with Crash Risk Index, Crash Rates, and Proactive Priority List Status
    a. Binary flags or fields for crash risk index > 15, crash rates for bicyclist serious injury crashes > 25%, crash rates for bicyclist minor injury crashes > 50%, crash rates for motorist serious injury crashes > 50%.
3. Top 25 regional projects and top <=10 projects per county as a separate table as seen in Appendix G – Corridors for Future Work Technical Memo
4. Intersections with Proactive Priority List Status
5. Crash Report Spatial Dataset

a. All fatal and injury crashes from 2018-2022 that were included in the Regional Safety Action Plan's High Injury Streets analyses
b. Agencies may also retrieve regularly updated crash data from MnDOT MnCMAT2.[8]

6. Publicly available dataset containing point locations of transit stops and stations, published by MnGeo.[9]

Using High Injury Streets, Crash Risk Index, Crash Rates, and Risk Factor Screening for Safety Planning and Prioritization

There are several common ways to use safety analysis results for local safety planning:

1. Identifying safety needs for further investigation and developing new safety projects to address these issues
2. Scoping other types of upcoming projects to identify safety needs that can be addressed as part of the project
3. Building a locally tailored High Injury Streets Identification from existing data

Identifying safety needs for further investigation and developing new safety projects

High Injury Streets represent streets in the region that have experienced a historic pattern of repeated fatal and serious injury crashes. If a local agency has a High Injury Street in their jurisdiction, they can prioritize it for further investigation (e.g., roadway safety audit).

Crash Risk Index, Crash Rates, and Risk Factor Screening are different ways of looking at where roadway conditions suggest the potential for severe crashes – even if severe crashes have not yet happened at these locations yet. These locations were selected because they look like roads that have experienced patterns of safety problems – such as having more lanes, higher motorist volumes, or higher speeds. These locations may also warrant further investigation, after High Injury Streets segments have been reviewed.

Local agencies can prioritize High Injury Streets locations first before reviewing the proactive datasets to ensure that efforts target the most significant safety problems first.

Identifying safety needs while scoping other types of projects

All the analysis results – High Injury Streets, Crash Risk Index, Crash Rates, and Risk Factor Screening – can be used when identifying safety needs to add in the project scoping phase for other types of projects. These projects represent good opportunities to proactively address safety, whether there has been a pattern of historic crashes or not. Therefore, local agencies can use all the safety analysis results interchangeably.

[8] https://www.dot.state.mn.us/stateaid/mncmat2.html
[9] https://gisdata.mn.gov/dataset/us-mn-state-metc-trans-transit-stops

Using the Regional Safety Action Plan's GIS layers to conduct a local safety analysis

Local agencies may wish to conduct their own safety analysis, project identification, and prioritization exercise. Geospatial data from the Regional Safety Action Plan can be used by local planners to support these efforts.

- Local agencies could use the raw sliding windows scoring data for their streets to identify the highest scoring facilities and build their own High Injury Streets or High Injury Network.
- Local agencies could also review the underlying scoring for the proactive analyses – crash risk index and crash rates – to identify local facilities that may benefit from proactive safety countermeasures.
- Simple network screening using the risk factors identified in this analysis and the Pedestrian Safety Action Plan can also be done; local agencies could identify streets on their network with higher speeds, more travel lanes, and higher volumes for consideration.